THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 13

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JAESHIN CHO, GREGORY L. HANSELL
and NARESH SAHA

Appeal No. 96-0386
Application No. 08/270,082[1]

ON BRIEF

Before THOMAS, BARRETT, and RUGGIERO, Administrative Patent Judges.

RUGGIERO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1-15, which constitutes all the claims in the application.

[1] Application for patent filed July 1, 1994.

The claimed invention relates to a method of forming an ohmic contact to a III-V semiconductor material. More particularly, Appellants disclose at pages 2 and 3 of the specification that after layers of silicon nitride, a dielectric, and a mask are formed on the semiconductor material, a portion of the dielectric layer is wet etched. As further disclosed at pages 4 and 5 of the specification, a dry etch is then performed on the silicon nitride layer using a chemical comprising a Group VI element. Finally, an ohmic metal layer contact is formed on the III-V semiconductor material as illustrated in Figures 2 and 3 of the drawings.

Claim 1 is illustrative of the invention and reads as follows:

1. A method of forming an ohmic contact, comprising the steps of:

providing a III-V semiconductor material;

forming a silicon nitride layer on the III-V semiconductor material;

forming a dielectric layer over the silicon nitride layer;

forming a masking layer over the dielectric layer;

removing a portion of the masking layer;

wet etching a portion of the dielectric layer such that the silicon nitride layer is not substantially etched;

dry etching a portion of the silicon nitride layer using a chemical comprised of a group VI element; and

forming an ohmic metal layer on the III-V semiconductor material.

The Examiner relies on the following references:

Johnson 5,144,410 Sep. 01, 1992
Suehiro (Japanese Kokai)[2] 3-11628 Jan. 18, 1991

Pinto et al. (Pinto), "Reactive Ion Etching in SF_6 Gas Mixtures," J. Electrochem. Soc.:SOLID STATE SCIENCE AND TECHNOLOGY, Vol. 134, No. 1, January 1987, pp. 165-175.

Claims 1-5 and 7-15 stand rejected under 35 U.S.C. § 103 as being unpatentable over Suehiro in view of Pinto. Claim 6 stands rejected under 35 U.S.C. § 103 as being unpatentable over Suehiro in view of Pinto and Johnson.

Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the Brief and Answer for the respective details.

OPINION

[2] A copy of the translation provided by the U.S. Patent and Trademark Office, February 1999, is included and relied upon for this decision.

We have carefully considered the subject matter on appeal, the rejections advanced by the Examiner and the evidence of obviousness relied upon by the Examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, Appellants' arguments set forth in the Brief along with the Examiner's rationale in support of the rejections and arguments in rebuttal set forth in the Examiner's Answer. It is our view, after consideration of the record before us, that the collective evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the art the obviousness of the invention as set forth in claims 1-15. Accordingly, we reverse.

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the Examiner is expected to make the factual

determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed.

Cir. 1984). These showings by the Examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

With respect to independent claims 1, 9, and 15, the Examiner seeks to modify the prior art method of Suehiro by relying on Pinto for supplying the missing teaching of dry etching a silicon nitride layer with a chemical comprised of a Group VI element. In response, Appellants assert a lack of suggestion or motivation in the references for combining or modifying teachings to establish a prima facie case of obviousness. After careful review of the Suehiro and Pinto references, we are in agreement with Appellants' stated position in the Brief. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. In re Fritch, 972 F. 2d 1260, 1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992). The

Examiner's statement of the grounds of rejection at page 3 of the Answer is lacking in any rationale as to why the skilled artisan would modify Suehiro in such a manner. We are left to speculate why one of ordinary skill would have found it obvious to choose a chemical that contains a Group VI element for dry etching the silicon nitride layer in Suehiro. The only reason we can discern is improper hindsight reconstruction of Appellants' claimed invention.

We do note that, in the responsive arguments portion at page 6 of the Answer, the Examiner alludes to a possible motivating factor for modifying Suehiro. The Examiner, although not stating the position clearly, apparently concludes that since Pinto acknowledges that a chemical containing a Group VI element (i.e. SF_6) can be used to etch silicon nitride to reduce damage caused by anisotropic etching, such would serve as a motivating factor to use SF_6 as a dry etch chemical to prevent damage to the substrate surface in Suehiro.

In response, Appellants contend (Brief, page 8) that such an assertion lacks factual support in Pinto. In Appellants' view, the disclosure of Pinto is directed to analysis of the

effect on anisotropy and selectivity of various mixtures of SF_6 used in the reactive ion etching technique of dry etching. Appellants assert that nowhere in Pinto is there any disclosure that dry etching with SF_6 or mixtures of SF_6 would cause less damage relative to any other dry etch chemical. After careful review of the reference to Pinto, we are in agreement with Appellants. However, even assuming, arguendo, that Pinto provides support for the notion that the use of SF_6 as a dry etch chemical prevents substrate damage in comparison with other chemicals, it is our view that it would not have been prima facie obvious to combine Suehiro and Pinto since we agree with Appellants (Brief, page 6) that Suehiro "teaches away" from the claimed invention. Instead of choosing a particular chemical to dry etch the silicon nitride layer to prevent damage to the substrate, Suehiro's solution to the problem is to add an additional protective layer of dielectric over the substrate. Accordingly, the skilled artisan would not have looked to the disclosure of Pinto to select a particular dry etch chemical to prevent damage in Suehiro when Suehiro's disclosed solution to the problem, i.e. the addition of a protective dielectric layer over the

substrate, obviates the need for any such substrate damage proof dry etch chemical. Since we are of the view that the prior art applied by the Examiner does not support the reaction, we do not sustain the rejection of independent claims 1, 9, and 15. Therefore, we also do not sustain the rejection of dependent claims 2-5, 7, 8, and 10-14.

With respect to dependent claim 6, the Examiner adds Johnson to the combination of Suehiro and Pinto solely to meet the "non-gold" ohmic metal layer limitation. Johnson, however, does not overcome the innate deficiencies of the combination of Suehiro and Pinto and, therefore, we do not sustain the rejection of claim 6 under 35 U.S.C. § 103. We note that, although Johnson was not applied against independent claim 1, the Examiner refers to a passage at col. 2, lines 51-55 which describes the exposure of a III-V compound substrate to an SF_6 plasma as suggesting a motivation for the use of an SF_6 etchant on a III-V substrate. In response, Appellants have provided an analysis at pages 10 and 11 of the Brief which supports their contention that the surface treatment described by Johnson can not be equated with the etch process claimed by Appellants and, therefore, could

not form a basis for an obvious rejection. The Examiner has not responded to such argument and, thus, based on the record before us, we are constrained to agree with Appellants.

In conclusion, we have not sustained the Examiner's rejection of any of the claims under 35 U.S.C. § 103. Therefore, the decision of the Examiner rejecting claims 1-15 is reversed.

REVERSED

JAMES D. THOMAS Administrative Patent Judge	)	
LEE E. BARRETT Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
JOSEPH F. RUGGIERO Administrative Patent Judge	)	

lp

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Appeal No. 96-0386
Application No. 08/270,082

APJ RUGGIERO

APJ THOMAS

APJ BARRETT

DECISION: REVERSED
Send Reference(s): Yes No
or Translation (s)
Panel Change: Yes No
Index Sheet-2901 Rejection(s): _____

Prepared: June 8, 2000

Draft Final

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OB/HD GAU

PALM / ACTS 2 / BOOK
DISK (FOIA) / REPORT